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REMARKS

This is a full and timely response to the outstanding final Office Action mailed March 7, 2006. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

1. Response to Rejection of Claims 1-5, 17-21, and 23 Under 35 U.S.C. §102

Claims 1-5, 17-21, and 23 have been rejected under 35 U.S.C. § 102(b) as being anticipated by DE 4138468. Applicants respectfully traverse this rejection.

It is axiomatic that "[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983). Therefore, every claimed feature of the claimed subject matter must be represented in the applied reference to constitute a proper rejection under 35 U.S.C. § 102(b). In the present case, not every feature of the claimed subject matter is represented in the DE 4138468 reference. Applicants discuss the DE 4138468 reference and Applicants' claims in the following.

a. Claim 1

As provided in independent claim 1, Applicants claim:

A laser machining apparatus comprising:

a laser beam configured to form a feature in a surface of a substrate;

a first liquid supply structure for directing liquid at the feature, wherein the feature comprises a shadow region to which liquid directed from the first liquid supply structure is obstructed; and,

at least a second different liquid supply structure for directing liquid generally toward the shadow region, wherein the first and second liquid supply structures are configured to deliver liquid to the feature at least a portion of a time that the laser beam operates on the substrate, wherein the feature is an elongate feature which extends generally along a long axis between a first feature end and a generally opposing second feature end, and wherein the first liquid supply structure is positioned proximate to the first feature end and the second liquid supply structure is positioned proximate to the second feature end.

(Emphasis added).

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Applicants respectfully submit that independent claim 1 is allowable for at least the reason that DE 4138468 does not disclose, teach, or suggest "at least a second different liquid supply structure for directing liquid generally toward the shadow region, wherein the first and second liquid supply structures are configured to deliver liquid to the feature at least a portion of a time that the laser beam operates on the substrate, wherein the feature is an elongate feature which extends generally along a long axis between a first feature end and a generally opposing second feature end, and wherein the first liquid supply structure is positioned proximate to the first feature end and the second liquid supply structure is positioned proximate to the second feature end," as recited and emphasized above in claim 1.

DE 4138468 appears to teach that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. The abstract of DE 4138468 states that spray devices are arranged around a laser beam and "emit a liquid-gas mixture stream which intersects the laser beam of the work position at the substrate." As shown in the figure accompanying the abstract, the spray from spray units 10 and 12 hit the substrate at the same location. Accordingly, DE 4138468 fails to teach "wherein the feature is an elongate feature which extends generally along a long axis between a first feature end and a generally opposing second feature end, and wherein the first liquid supply structure is positioned proximate to the first feature end and the second liquid supply structure is positioned proximate to the second feature end," since the mixture streams overlap with each other and the laser beam at one general spot which is not an elongated feature. For at least this reason, claim 1 is not anticipated by DE 4138468, and the rejection should be withdrawn for at least this reason alone.

b. Claims 2-3 and 5

Because independent claim 1 is allowable over the cited art of record, dependent claims 2-3 and 5 (which depend from independent claim 1) are allowable as a matter of law for at least the reason that the dependent claims 2-3 and 5 contain all the features of independent claim 1. For at least this reason, the rejections of claims 2-3 and 5 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 2-3 and 5, these claims recite further features and/or combinations of features (as is apparent by

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examination of the claim itself) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

For example, DE 4138468 appears to disclose that each spray unit is oriented at the same acute angles with respect to a long axis. Thus, DE 4138468 fails to teach or suggest at least "wherein the first liquid supply structure is oriented to eject liquid along a first axis which lies at an acute angle relative to the long axis and the second liquid supply structure is oriented to eject liquid along a second axis which lies at a second different acute angle relative to the long axis," as recited in claim 5.

For at least these reasons, the rejections should be withdrawn.

c. Claim 4

Claim 4 is canceled without prejudice, waiver, or disclaimer, and therefore, the rejection to this claim is rendered moot. It is noted that features of claim 4 were added to independent claim 1. Applicants take this action merely to reduce the number of disputed issues and to facilitate early allowance and issuance of other claims in the present application. Applicants reserve the right to pursue the subject matter of this canceled claim in a continuing application, if Applicants so choose, and do not intend to dedicate any of the canceled subject matter to the public.

d. Claim 17

As provided in independent claim 17, Applicants claim:

An apparatus comprising:
a laser beam configured to act on a substrate to form a feature through a first substrate surface; and,
a first nozzle oriented to deliver liquid to the feature and at least a second nozzle oriented to deliver liquid to the feature while the laser beam acts on the substrate, *where a region of the feature to which there is an obstruction from the first nozzle is supplied with liquid by the at least a second nozzle from which the obstruction is not present, wherein the first nozzle and the at least a second nozzle comprise at least three nozzles.*

(Emphasis added).

Applicants respectfully submit that independent claim 17 is allowable for at least the reason that DE 4138468 does not disclose, teach, or suggest at least "where a region of the feature to which there is an obstruction from the first nozzle is supplied

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with liquid by the at least a second nozzle from which the obstruction is not present, wherein the first nozzle and the at least a second nozzle comprise at least three nozzles," as recited and emphasized above in claim 17.

Rather, DE 4138468 teaches that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. In the figure accompanying the abstract, two nozzles are shown to be present for emitting a liquid-gas mixture. Thus, DE 4138468 does not appear to teach or suggest "wherein the first nozzle and the at least a second nozzle comprise at least three nozzles," as recited in claim 17. Therefore, claim 17 is not anticipated by DE 4138468, and the rejection should be withdrawn for at least this reason alone.

e. Claims 18 and 20

Because independent claim 17 is allowable over the cited art of record, dependent claims 18 and 20 (which depend from independent claim 17) are allowable as a matter of law for at least the reason that the dependent claims 18-20 contain all the features of independent claim 17. For at least this reason, the rejections of claims 18-20 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 18 and 20, these claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

f. Claim 19

Claim 19 is canceled without prejudice, waiver, or disclaimer, and therefore, the rejection to this claim is rendered moot. It is noted that features of claim 19 were added to independent claim 17. Applicants take this action merely to reduce the number of disputed issues and to facilitate early allowance and issuance of other claims in the present application. Applicants reserve the right to pursue the subject matter of this canceled claim in a continuing application, if Applicants so choose, and do not intend to dedicate any of the canceled subject matter to the public.

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g. Claims 21 and 23

As provided in independent claim 21, Applicants claim:

An apparatus comprising:

a means for generating optical energy sufficient to remove substrate material to form a feature in a substrate;

a first means for supplying liquid to at least a portion of the feature; and,

a second means for supplying liquid to a region of the feature to which the first means is obstructed; and

means for selectively supplying liquid from the first means, second means, or both the first and second means.

(Emphasis added).

Applicants respectfully submit that independent claim 21 is allowable for at least the reason that DE 4138468 does not disclose, teach, or suggest at least "means for selectively supplying liquid from the first means, second means, or both the first and second means," as recited and emphasized above in claim 21.

Rather, DE 4138468 teaches that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. "The constant sp[ra]ying of the work area forms a liquid film which prevents the surrounding areas, which are not to be affected by the laser from drying up." See abstract. Thus, DE 4138468 does not appear to teach or suggest "selectively supplying" a liquid from a first means, second means, or both, as described in claim 21. Therefore, claim 21 and claim 23 (which depends from claim 21) are not anticipated by DE 4138468, and the rejections should be withdrawn for at least this reason alone.

2. Response to Rejections of Claims Under 35 U.S.C. §103

In the Office Action, claim 6 stands rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over DE 4138468 in view of WO 03028943 A1; claims 7 and 8 stand rejected as allegedly being unpatentable over DE 4138468; claims 9-16 and 37-39 stand rejected as allegedly being unpatentable over DE 4138468 in view of WO 03028943 A1 in further view of *Kumar* (U.S. Patent No. 5,676,256) in further view of *Ohtoshi* (U.S. Patent No. 5,539,211); claim 22 stands rejected as allegedly being unpatentable over DE 4138468 in view of *Kumar* in further view of *Ohtoshi*; and claims 24-36 stand rejected as allegedly being unpatentable over DE 4138468 in view of WO

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03028943 A1 in further view of *Cahill* (U.S. Patent Application Publication No. 2003/0117449 A1).

It is well-established at law that, for a proper rejection of a claim under 35 U.S.C. §103 as being obvious based upon a combination of references, the cited combination of references must disclose, teach, or suggest, either implicitly or explicitly, all elements/features/steps of the claim at issue. *See, e.g., In Re Dow Chemical*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988), and *In re Keller*, 208 U.S.P.Q.2d 871, 881 (C.C.P.A. 1981).

a. Claims 6-8

Because independent claim 1 is allowable over the cited art of record, dependent claims 6-8 (which depend from independent claim 1) are allowable as a matter of law for at least the reason that the dependent claims 6-8 contain all the features of independent claim 1 and WO 03028943 A1 fails to remedy all of the deficiencies of the DE 4138468 reference. For at least this reason, the rejections of claims 6-8 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 6-8, these claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

For example, WO 03028943 A1 discloses a system utilizing one spray nozzle 14 and a liquid vacuum suction hose and nozzle 18. *See* page 6, last paragraph. Thus, WO 03028943 A1 does not teach or suggest "wherein the first axis lies at a 50 degree angle relative to a first substrate surface into which the feature is formed and the second axis lies at a 50 degree angle to the first surface and 80 degrees relative to the first axis" with respect to first and second liquid supply structures, as described in claim 6, since there is only one spray nozzle featured in the WO 03028943 A1 reference. The DE 4138468 reference is described as showing an 80 angle relative to a substrate surface in the Office Action. Accordingly, a nozzle in the DE 4138468 reference would lie at a 20 degree angle with respect to the axis of the other nozzle. None of the cited art therefore teaches or suggests at least the characteristic of varying angles in the manner described in the claim. Thus, a *prima facie* case of obviousness has not been established.

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Further with respect to the Office Action characterization that claims 7 and 8 involve a change in size, Applicants submit that the claims involve positioning of claimed components in a manner that is not obvious in view of the cited art.

For at least these reasons, the rejections should be withdrawn.

c. Claim 9

As provided in independent claim 9, Applicants claim:

An apparatus comprising:

at least one laser source that supplies a laser beam to operate on a substrate at a laser interaction zone to form a feature in the substrate;
a first nozzle oriented to deliver liquid along a first liquid supply path to the feature, so that the liquid is delivered to the laser interaction zone; and,

at least a second different nozzle oriented to deliver liquid to the laser interaction zone along a second different liquid supply path, *wherein the first nozzle and at least the second different nozzle are selectively activated based upon the location of the laser interaction zone in the substrate.*

(Emphasis added).

Applicants respectfully submit that independent claim 9 is allowable for at least the reason that DE 4138468 in view of WO 03028943 A1 in further view of *Kumar* in further view of *Ohtoshi* does not disclose, teach, or suggest at least "wherein the first nozzle and at least the second different nozzle are selectively activated based upon the location of the laser interaction zone in the substrate," as recited and emphasized above in claim 9.

Rather, DE 4138468 teaches that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. Further, the abstract states that there is "constant spraying of the work area." Thus, DE 4138468 does not teach or suggest "wherein the first nozzle and at least the second different nozzle are selectively activated based upon the location of the laser interaction zone in the substrate," as recited in claim 9. Further, WO 03028943 A1 discloses the use of only one spray nozzle and not a first and a second different nozzle as described in the claim.

With regard to *Kumar*, it appears to disclose a system in which air nozzles are selectively activated to direct a jet of air onto selected scrap particles so that the particles are selectively directed into separate bins. Further, *Ohtoshi* appears to disclose a system

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for selectively introducing active species of a gas to a plasma generating apparatus 32. As such, *Kumar* and *Ohtoshi* do not teach or suggest "wherein the first nozzle and at least the second different nozzle are selectively activated based upon the location of the laser interaction zone in the substrate." For at least this reason, *Kumar* and *Ohtoshi* do not cure or remedy the deficiencies of the DE 4138468 and WO 03028943 A1 references. Therefore, a *prima facie* case establishing an obviousness rejection by DE 4138468 in view of WO 03028943 A1 in further view of *Kumar* in further view of *Ohtoshi* has not been made. Thus, claim 9 is not obvious under proposed combination and the rejection should be withdrawn.

d. Claims 10-16

Because independent claim 9 is allowable over the cited art of record, dependent claims 10-16 (which depend from independent claim 9) are allowable as a matter of law for at least the reason that the dependent claims 10-16 contain all the features of independent claim 9. For at least this reason, the rejections of claims 10-16 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 10-16, these claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

e. Claim 22

Because independent claim 21 is allowable over the cited art of record, dependent claim 22 (whichs depend from independent claim 21) is allowable as a matter of law for at least the reason that the dependent claim 22 contains all the features of independent claim 21 and *Kumar & Ohtoshi* fail to remedy all of the deficiencies of the DE 4138468 reference. For at least this reason, the rejection of claim 22 should be withdrawn.

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f. Claim 24

As provided in independent claim 24, Applicants claim:

A method comprising:

first configuring a laser machine to deliver liquid along a first liquid supply path to a substrate while laser machining a feature into the substrate to a first feature depth; and,

second configuring the laser machine to deliver liquid along at least one different liquid supply path to the substrate while laser machining the feature into the substrate to a second greater feature depth comprising at least a majority of a thickness of the substrate extending between a first substrate surface and a second substrate surface.

Applicants respectfully submit that independent claim 24 is allowable for at least the reason that DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* does not disclose, teach, or suggest all of the claimed features above.

For example, DE 4138468 teaches that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. As shown in the figure, the spray from spray units 10 and 12 hit the substrate at the same location. Accordingly, DE 4138468 fails to teach or suggest delivering liquid along a first liquid supply path for a first feature depth and delivering liquid along at least one different liquid supply path for a second greater feature depth, as described in the claim. Also, WO 03028943 A1 discloses the use of only one spray nozzle and not a plurality of nozzles as suggested in the Office Action. *Cahill* is cited in the Office Action to "disclose (Figures 6E-6L) well known work piece shapes comprising different features at different depths," which does not remedy the deficiencies of the other references in disclosing the claimed features. Page 4. If all the individual references of a proposed combination fail to disclose a claimed feature, the proposed combination also does not teach or suggest the claimed feature. As such, a *prima facie* case establishing an obviousness rejection by DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* has not been made. Thus, claim 24 is not obvious under proposed combination and the rejection should be withdrawn.

g. Claims 25-29

Because independent claim 24 is allowable over the cited art of record, dependent claims 25-29 (which depend from independent claim 24) are allowable as a

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matter of law for at least the reason that the dependent claims 25-29 contain all the features of independent claim 24. For at least this reason, the rejections of claims 25-29 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 25-29, these claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

h. Claim 30

As provided in independent claim 30, Applicants claim:

A method of laser micromachining a substrate comprising:
forming a feature into a substrate, at least in part, by directing a laser beam at the substrate; and,
during at least a portion of said forming, supplying liquid to at least a first region of the feature along a first liquid supply path and supplying liquid to at least a second different region of the feature along at least a second liquid supply path, wherein said acts of supplying liquid allow the feature to be formed at a faster rate than would be achieved in the absence of the liquid.

Applicants respectfully submit that independent claim 30 is allowable for at least the reason that DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* does not disclose, teach, or suggest all of the claimed features above.

For example, DE 4138468 teaches that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. As shown in the figure, the spray from spray units 10 and 12 hit the substrate at the same location. Accordingly, DE 4138468 fails to teach or suggest delivering liquid along a first liquid supply path for a first region and delivering liquid along at least a second liquid supply path for a second different region, as described in the claim. Also, WO 03028943 A1 discloses the use of only one spray nozzle and not a plurality of nozzles as suggested in the Office Action. *Cahill* is cited in the Office Action to "disclose (Figures 6E-6L) well known work piece shapes comprising different features at different depths," which does not remedy the deficiencies of the other references in disclosing the claimed features. Page 4. If all the individual references of a proposed combination fail to disclose a claimed feature, the proposed combination also does not teach or suggest the claimed feature. As such, a *prima facie* case establishing an obviousness rejection by

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DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* has not been made. Thus, claim 30 is not obvious under proposed combination and the rejection should be withdrawn.

i. Claims 31-32

Because independent claim 30 is allowable over the cited art of record, dependent claims 31-32 (which depend from independent claim 30) are allowable as a matter of law for at least the reason that the dependent claims 31-32 contain all the features of independent claim 30. For at least this reason, the rejections of claims 31-32 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 31-32, these claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

j. Claim 33

As provided in independent claim 33, Applicants claim:

A method comprising:

forming a feature into a substrate, at least in part, by directing a laser beam at the substrate to remove substrate material at a laser interaction zone; and,

during at least a first duration of said directing, first supplying liquid to the laser interaction zone from a first nozzle, and during at least a second different duration of said directing, second supplying liquid to the laser interaction zone from at least a second different nozzle.

Applicants respectfully submit that independent claim 33 is allowable for at least the reason that DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* does not disclose, teach, or suggest all of the claimed features above.

For example, DE 4138468 teaches that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. As shown in the figure, the spray from spray units 10 and 12 hit the substrate at the same location. Accordingly, DE 4138468 fails to teach or suggest supplying liquid from one nozzle for a first duration and supplying liquid from a second different nozzle during a second duration, as described in the claim. Also, WO 03028943 A1 discloses the use of

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only one spray nozzle and not a plurality of nozzles as suggested in the Office Action. *Cahill* is cited in the Office Action to "disclose (Figures 6E-6L) well known work piece shapes comprising different features at different depths," which does not remedy the deficiencies of the other references in disclosing the claimed features. Page 4. If all the individual references of a proposed combination fail to disclose a claimed feature, the proposed combination also does not teach or suggest the claimed feature. As such, a *prima facie* case establishing an obviousness rejection by DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* has not been made. Thus, claim 33 is not obvious under proposed combination and the rejection should be withdrawn.

k. Claims 34-36

Because independent claim 33 is allowable over the cited art of record, dependent claims 34-36 (which depend from independent claim 33) are allowable as a matter of law for at least the reason that the dependent claims 34-36 contain all the features of independent claim 33. For at least this reason, the rejections of claims 34-36 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 34-36, these claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

l. Claim 37

As provided in independent claim 37, Applicants claim:

A method comprising:
forming a feature into a substrate, at least in part, by directing a laser beam at the substrate to remove substrate material at a laser interaction zone; and,
during at least a first duration of said directing, selectively controlling a delivery of liquid to the laser interaction zone along at least two different liquid supply paths.

Applicants respectfully submit that independent claim 37 is allowable for at least the reason that DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* does not disclose, teach, or suggest all of the claimed features above.

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For example, DE 4138468 teaches that a spray unit 10 directs liquid and gas into the path of a laser beam 18, as shown in the figure accompanying the abstract. As shown in the figure, the spray from spray units 10 and 12 hit the substrate at the same location. Accordingly, DE 4138468 fails to teach or suggest selectively controlling delivery of liquid along at least two different liquid supply paths, as described in the claim. Also, WO 03028943 A1 discloses the use of only one spray nozzle and not a plurality of nozzles as suggested in the Office Action. *Cahill* is cited in the Office Action to "disclose (Figures 6E-6L) well known work piece shapes comprising different features at different depths," which does not remedy the deficiencies of the other references in disclosing the claimed features. Page 4. If all the individual references of a proposed combination fail to disclose a claimed feature, the proposed combination also does not teach or suggest the claimed feature. As such, a *prima facie* case establishing an obviousness rejection by DE 4138468 in view of WO 03028943 A1 in further view of *Cahill* has not been made. Thus, claim 37 is not obvious under proposed combination and the rejection should be withdrawn.

m. Claims 38-39

Because independent claim 37 is allowable over the cited art of record, dependent claims 38-39 (which depend from independent claim 37) are allowable as a matter of law for at least the reason that the dependent claims 38-39 contain all the features of independent claim 37. For at least this reason, the rejections of claims 38-39 should be withdrawn.

Additionally and notwithstanding the foregoing allowability of claims 38-39, these claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record. For example, claim 39 recites the feature "wherein said selectively controlling comprises delivering liquid along the second liquid supply path and not delivering liquid along the first liquid supply path when the laser interaction zone is in a second region of the feature that is obstructed from being directly supplied by the first path," which is not taught or suggested by the cited art.


Hence, there are other reasons why these dependent claims are allowable.

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CONCLUSION

For at least the reasons set forth above, Applicants respectfully submit that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned agent at (770) 933-9500.

Respectfully submitted,


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